AMENDMENTS TO THE SPECIFICATION

Please amend the paragraphs on page 1, actual lines 3-13 (numbered lines 1-11) with the following:

BACKGROUND

The invention relates to a method suitable for placing at least one component in a desired position on at least one substrate by means of a ~~device, which device is provided with a displaceable arm on which at least one placement device and at least one image recording device are present, such that the image recording device records an image of a reference element located on a substrate, whereupon the location of the desired position relative to the reference element is determined by means of a processor on the basis of said image, and subsequently the component is placed in the desired position on the substrate by the placement device.~~ device. The invention further relates to a device for performing such a method. ~~comprising at least an image recording device and at least one placement device for placing a component on a substrate, said image recording device and said placement device being located on an arm.~~

Please amend the paragraphs starting on page 1, line 21 and ending on page 4, actual line 22 (numbered line 24) with the following:

~~Such a~~ The method of WO97/38567 has the disadvantage that at any given moment either only a component is placed by the placement device or only an image is made of a substrate.

A component placement device is also known from WO97/38567; this placement device is provided with an arm on which a single placement device and a single image recording device are situated, and with a transport belt located below the arm by means of which the substrates are displaced. The component placement device according to the prior art is furthermore provided with a further image recording device.

A disadvantage of the component placement device in WO97/38567 is that it has a limited capacity, i.e., comparatively few components per unit time can be placed by the component placement device.

~~The invention has for its object~~ An object of the invention is to provide a method by which more components can be placed in a given amount of time. Another object of the invention to increase capacity.

SUMMARY

An embodiment of the invention relates to a method suitable for placing at least one component in a desired position on at least one substrate by means of a device. The device is provided with a displaceable arm on which at least one placement device and at least one image recording device are present, such that the image recording device records an image of a reference element located on a substrate, whereupon the location of the desired position relative to the reference element is determined by means of a processor on the basis of the image, and subsequently the component is placed in the desired position on the substrate by the placement device.

The invention further relates to a device that includes, among other possible things, at least an image recording device and at least one placement device for placing a component on a substrate, the image recording device and the placement device being located on an arm.

~~This object is achieved in the~~ According to a method according to the ~~invention in that the arm~~ invention, an arm is provided with at least two image recording devices situated at a certain pitch distance from each other and with at least two placement devices situated at the same pitch distance from one another, ~~said image~~ the image recording devices and placement devices being distant from one another ~~by once said~~ by one pitch distance or a multiple thereof, such that at least one image recording device records an image of at least one reference element located on a substrate while at the same time at least one placement device places a component on a substrate. ~~Since~~ As an image ~~is taken and~~ may be taken while a component is placed ~~at the same time~~, components can be placed successively on the substrates more quickly. It is possible to use two image recording devices and two placement devices or more than two, with the result that even more components can be placed per unit time.

~~An embodiment~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, the image recording devices may take images

simultaneously, while at the same time the placement devices may place components simultaneously. ~~The advantage~~ An advantage of this efficient method is that more components are placed per unit ~~time, i.e. the~~ time, i.e., capacity is increased.

~~Another~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, four substrates ~~are situated~~ may be situated at one and the same pitch distance from one another, with the image recording devices taking images of two substrates simultaneously, while at the same time the placement devices place components simultaneously on the other two substrates. In this method, the pitch of the substrate ~~is equal~~ may be equal to the pitch of the image recording devices and the placement devices. An advantage ~~The advantage~~ of this embodiment is that the method optimally utilizes the device, ~~i.e. comparatively many~~ i.e., comparatively more components per unit ~~time are~~ time may be placed by means of this method.

~~Still~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, each image recording device ~~cooperates with a~~ may cooperate with an associated placement device, such that first a first image recording device ~~takes~~ may take an image while at the same time the associated placement device ~~places~~ may place a component, whereupon the second image recording device ~~takes~~ may take an image while at the same time the associated second placement device ~~places~~ may place a component. This method ~~is suitable~~ may be suitable for placing components on substrates ~~which~~ that are at a distance from one another greater than the pitch distance between the placement devices and image recording devices.

~~A further~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, the placement devices may pick up two components simultaneously from a component feeder device. Components ~~are thus~~ may thus be picked up by the placement devices in an efficient manner.

~~A yet further~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, the substrate ~~is located~~ may be located on a positioning ~~table, which positioning~~ table that is controlled by the processor in the plane of the substrate, while the component ~~is placed~~ may be placed in the desired position on the substrate by the placement device. An advantage of such a method is that components can still be placed simultaneously on the substrates if there is a slight deviation between substrates after a displacement of a substrate.

~~A still further~~ According to another embodiment of the method according to the ~~invention is characterized in that~~ invention, the placement ~~devices are~~ devices may be displaceable in the plane of the substrate independently of one another. It is possible also in such a method to correct deviations in orientation between two substrates, so that two components ~~can be~~ may be placed in the correct positions on two, not identically oriented substrates by the placement devices.

~~A component placement device is furthermore known from the international application cited above, provided with an arm on which a single placement device and a single image recording device are situated, and with a transport belt located below said arm by means of which the substrates are displaced. The component placement device according to the prior art is furthermore provided with a further image recording device.~~

~~It is a disadvantage of the known component placement device that it has a limited capacity, i.e. that comparatively few components per unit time can be placed by the component placement device.~~

~~It is a further object of the invention to increase the capacity of the known device.~~

~~This object is achieved in the~~ According to a device according to the ~~invention in that the arm is~~ invention, an arm may be provided with at least two image recording devices situated at a certain pitch distance from each other and with at least two placement devices situated at the same pitch distance from one another, ~~said image~~ the image recording devices and placement devices being distant from one another ~~by once said~~ by one pitch distance or a multiple thereof. An advantage of such a configuration is that the capacity of the ~~device is~~ device may be comparatively great because at least two image recording devices can take a same number of images simultaneously per unit time and at the same time at least two placement devices can place a same number of components per unit time.

~~An embodiment~~ According to an embodiment of the device according to the ~~invention is characterized in that~~ invention, the device ~~is further~~ may further be provided with at least two fluxing devices ~~which~~ that have the same pitch distance as the placement devices. An advantage ~~The advantage~~ of this is that several components ~~can be~~ may be fluxed simultaneously. The result is that the time required for ~~fluxing is~~ fluxing may be comparatively short, whereby the capacity of the device ~~is further~~ may further be improved.

~~Another~~ According to another embodiment of the device according to the ~~invention is characterized in that~~ invention, the device ~~is provided~~ may be provided with at least two

further image recording devices ~~which~~ that have the same pitch distance to one another as the placement devices. The two further image recording devices ~~are capable~~ may be capable of determining the positions of the components on the placement devices simultaneously. ~~The advantage~~ An advantage of this is that the time required for determining the positions of components on the placement ~~devices is~~ devices may be comparatively short, so that the capacity of the device according to the ~~invention is~~ invention may be comparatively great.

~~A further~~ According to another embodiment of the device according to the ~~invention is characterized in that~~ invention, the image recording devices and the placement ~~devices are~~ devices may be situated in one line, such that the two image recording devices are situated next to one another and the two placement devices are situated at one side of the image recording devices. ~~This renders~~ As a result, the construction and the control of the device is comparatively simple.

~~The invention will now be explained in more detail with reference to the accompanying drawings, in which:~~

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only, and are not restrictive of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become apparent from the following description, appended claims, and the accompanying exemplary embodiments shown in the drawings, which are briefly described below.

Please add the following heading on page 4 between actual lines 26 and 27 (numbered lines 28 and 29):

DETAILED DESCRIPTION

Please amend the paragraph starting on page 4, actual line 29 (numbered line 33) and ending on page 5, line 10 with the following:

Fig. 1 shows a device 1 ~~which~~ that is provided with an arm 2 ~~which~~ that is displaceable over a guide 3 by means of a servomotor in and opposite to a direction indicated by arrow P1. The guide 3 is displaceable by means of two servomotors in and opposite to the directions indicated by arrows P2 and P3. The directions indicated by the arrows P2 and P3 are parallel to one another and transverse to the direction indicated by the arrow P1. The arm 2 can be accurately aligned as a result of this because the ends of the guide 3 can be displaced by two separate servomotors in and opposite to the directions indicated by the arrows P2 and P3. Two image recording devices 9, 10 and two placement devices 11, 12 are fastened to the arm 2. The placement devices 11, 12 have a pitch distance S_1 to one another, while the image recording devices 9, 10 have the same mutual pitch distance S_2. The pitch distance S_3 between the placement device 11 and the image recording device 10 is equal to the pitch distances S_1, S_2.

Please replace the paragraphs starting on page 5, line 22 and ending on page 6, line 13 with the following:

The initial situation is one in which the transport device (also referred to as a "belt") 4 has moved substrates 5, 6, 7, 8 into the positions shown in Fig. 1. The positions of reference elements (not shown) present on the substrates 5, 6 have already been determined ~~here from~~ from images recorded by the image recording devices 9, 10.

~~From this situation,~~ Subsequently, the arm 2 with the placement devices 11, 12 fastened thereto is displaced along the guide 3 in or opposite to the direction indicated by the arrow P1, while at the same time the guide 3 is displaced in or opposite to the directions indicated by the arrows P2, P3 until the placement devices 11, 12 are situated above the component feeder device 13. ~~Since~~ As the ends of the guide 3 are to a certain extent separately displaceable in the directions indicated by the arrows P2, P3, it is possible to ensure that the guide 3 will always extend parallel to the transport belt 4.

Components are picked up in the component feeder device 13 by the placement devices 11, 12. Preferably, the components to be picked up have a pitch ~~which~~ that corresponds to the pitch S_1 between the placement devices 11, 12, so that the components can be picked up simultaneously, for example by means of pipettes (not shown) present in the placement devices 11, 12. Then the placement devices 11, 12 ~~are displaced~~ may be displaced by the arm to a position situated above the two further image recording devices 16, 17, where ~~said two~~ the two further image recording devices 16, 17 simultaneously determine the positions of the picked- up components with respect to the placement devices 11, 12.

The placement devices 11, 12 are subsequently moved by the arm 2 to positions situated above the fluxing devices 14, 15, where flux is applied to the components. ~~The placement~~ Subsequently, the devices 11, 12 are ~~then moved~~ moved to above a desired position on the substrates 5, 6. The desired positions are determined from the locations of the reference elements on the substrates 5, 6 determined previously by the image recording devices 9, 10 and from information relating to the desired positions of the components to be placed with respect to the reference elements.

Please replace the paragraphs starting on page 6, line 18 and ending on page 7, line 11 with the following:

While the components are being placed on the substrates 5, 6 by the placement devices 11, 12, images can be, and are indeed simultaneously taken of the substrates 7, 8 by the two image recording devices 9, 10. The substrates 5, 6, 7, 8 ~~are displaced~~ may be displaced over a distance equal to twice the pitch S_1 by the transport belt 4 after the components have been placed and the images have been taken. As a result, the substrates 7, 8 will come to lie below the placement devices 11, 12, and at the same time new substrates (not shown) ~~are positioned~~ may be positioned below the image recording devices 9, 10. The placement devices 11, 12 ~~are moved~~ may be moved to a position above the component feeder device 13 again during the displacement of the substrates.

Fig. 2 shows an alternative application of the device according to the invention. Substrates 20, 21 have been displaced to a position below the image recording devices 9, 10 and placement devices 11, 12 in the device 1 by means of the transport belt 4, which

substrates 20, 21 have a length greater than the pitch distance S_1, S_2, S_3. In such a case, the substrates on the transport belt 4 are given a pitch ~~which~~ that is equal to a multiple of the pitch S_1, S_2, S_3. In the situation shown in Fig. 2, the pitch S_7 of the substrates 20, 21 is equal to $2S_1$. The operation of the device 1 in such a situation is as follows.

Components are taken from the component feeder device 13 by the placement devices 11, 12 in the manner ~~described above. Since~~ previously described. As the two components will be placed on the same substrate, the components may be identical or different. Subsequently, the further image recording devices 16, 17 determine the locations of the components with respect to the placement devices 11, 12 in the manner ~~described above,~~ previously described, and the components are provided with flux by the fluxing devices 14, 15. Then the placement device 12 is moved into a desired position above the substrate 20. ~~Since~~ As the distance between the image recording device 10 and the placement device 12 is equal to $2S_1$, which distance is equal to the pitch S_7 of the substrates 20, 21, the image recording device 10 will be positioned above a position of the substrate 21 on which in a subsequent phase a component is to be placed identical to the one currently being placed on the substrate 20 by the placement device 12. An image can be, and is indeed taken of the substrate 21 by the image recording device 10 while the component is being placed on the substrate 20.

Please replace the paragraphs on page 7, lines 16-22 with the following:

Accordingly, an image can be, and is indeed taken of the substrate 21 by the image recording device 9 while the component is being placed on the substrate 20. After the desired number of components has been placed on the substrate 20, the substrates 20, 21 ~~are moved~~ may be moved by the transport belt 4 in the direction indicated by the arrow P4 over a distance S_7, such that the substrate 21 is positioned below the placement devices 11, 12, and a new substrate (not shown) ~~is positioned~~ may be positioned below the image recording devices 9, 10, whereupon the entire cycle can be repeated.

Please replace the paragraph on page 7, lines 27-31 with the following:

It is ~~obvious~~ also possible to place different components on a single substrate before the substrate is displaced in the direction indicated by the arrow P4 by the transport belt 4. If several components are placed on a single substrate, several images of the ~~substrate are~~ substrate may first be taken in a prior phase so as to determine the desired position for each component to be placed.

Given the disclosure of the present invention, one versed in the art would appreciate that there may be other embodiments and modifications within the scope and spirit of the invention. Accordingly, all modifications attainable by one versed in the art from the present disclosure within the scope and spirit of the present invention are to be included as further embodiments of the present invention. The scope of the present invention is to be defined as set forth in the following claims.